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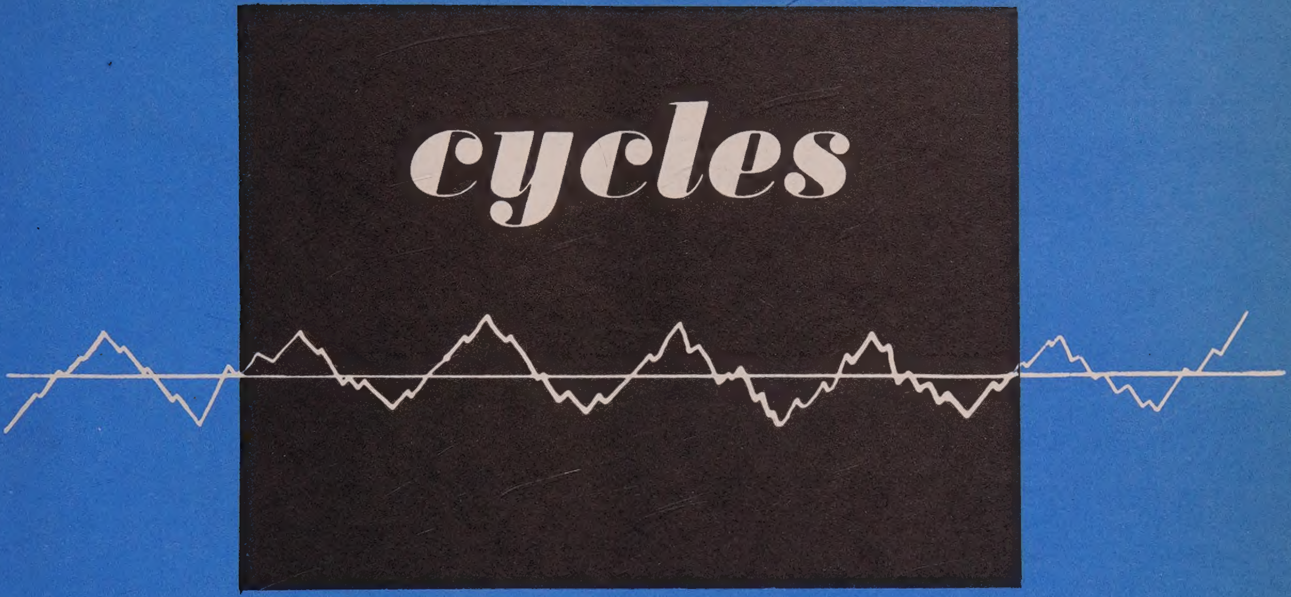

October 1954

FOUNDATION FOR THE STUDY OF CYCLES
New York, New York

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cycles

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VOLUME V NUMBER 8 OCTOBER 1954

The Director's Letter

Dear Member:

Forecasting

I can think of only five basic methods of forecasting, namely,

1. Lead and lag forecasting
2. The use of brains
3. The use of intuition
4. Actuarial methods
5. The use of internal evidence
    - (a) cyclic
    - (b) non-cyclic

Let me discuss these in turn.

Lead and Lag Forecasting

An excellent method of forecasting—when it works—is lead and lag forecasting. To use this method you merely find something which goes up and down in the same way as the figures in which you are interested—but which does it first. For example, dawn comes several hours before sunrise. Fall always precedes winter. Contracts for highway construction go up and down in much the same way as cement production but they do it several months earlier.

The Geisinger Indicator which I am now printing for you each issue is based in part on this principle of lead and lag forecasting. Mr. Geisinger has found some series of figures which, in combination, tend to turn ahead of industrial production as a whole (see pages 296 and 297).

The Use of Brains

The use of brains is another good way to forecast—if you have brains! You figure out that because something has happened, something else will follow suit. When I try this method, I generally find that there are other factors in the situation which I did not know of, or to which I failed to give proper weight. The result is, that although my brains were all right as far as they went, they did not go far enough. So, when I try to reason things out, I often find myself wrong. But maybe you are smarter.

Intuition

A lot of people operate on hunch. Sometimes it works very well. Hunch is a good way of forecasting—if you have a good huncher. I don't.

Presidents of companies which are largely dependent on one raw material such as cotton, wool, molasses, wheat, scrap iron, etc. often dictate buying policy. Sometimes they act on hunch. Sometimes they are right. These times they remember. Usually there is no one around tactless enough to remind them of the other (more frequent) times when they were wrong!

Actuarial Methods

Actuarial methods are based on the fact that, *if the odds are in your favor,* and if you play the game often enough, you will win in the long run. Using this method you don't need to know or care *which* venture will succeed.

That is, suppose you *know* that 8 out of 10 ships will return. If the gain on the eight will more than cover the loss on the 2, you will come out all right in the end. You don't need to care which particular ships will or will not come back.

Use of Internal Evidence

The method of internal evidence is often called "Letting the market tell its own story."

There are two main methods of forecasting by internal evidence: cyclic and non-cyclic.

Cyclic Forecasting

Cyclic forecasting is based upon the fact that when the ups and downs in a series of figures have repeated in such a way that the regularity can not easily be the result of random forces, it is unwise to ignore the possibility that the observed behavior may continue.

Cyclic forecasting in turn is of two kinds: one kind deals with non rhythmic movements such as the irregular zigzags of an airplane trying to escape from ack-ack. The other kind of cyclic forecasting deals with rhythm—events which repeat with a beat. The magazine *Cycles* is devoted to cyclic forecasting of the latter sort.

Non-Cyclic Forecasting

There are three methods of non-cyclic forecasting from internal evidence which occur to me.

Serial Correlation

The first method is based upon what statisticians call serial correlation.

This method depends for its usefulness upon the fact that the events of the immediate future are not likely to be far different from the events of the immediate past. Sales, for example, go up or down gradually. You never have the month of *least* sales immediately following the month of greatest sales, and vice versa. As you always know the sales of the immediate past, you always have *some* light on the sales of the immediate future. This light can be expressed in terms of probabilities.

One trouble with this method is that it throws no light upon the *direction* in which events are going to move. It merely says, for example, "The odds are 10 to 1 that next month's sales will not be higher than so much nor lower than so much." You can make your odds read anything you like, but the bigger the odds the wider the tolerances.

Channels

A second method of statistical forecasting is akin to that used by quality control engineers. Events tend to fluctuate around an axis. When the fluctuations exceed certain tolerances which can be set, the probabilities are that the "trend" (the axis) itself has changed.

This principle is used by many stock market forecasters who establish "channels" within which prices seem to fluctuate and who then attach importance to price moves which break out of these channels.

Modifications of this principle are found in stock market forecasting methods which make use of intersecting non-centered moving averages. It often happens that major changes in direction show themselves in the crossing of one moving average by a moving average of shorter length.

The Dow theory is another example of this same basic principle.

Slope

A third method of statistical forecasting from internal evidence arises from the fact that changes in the underlying trend generally come about gradually. Speaking mathematically, this means that the slope of the curve often decreases prior to the actual turning point. Therefore, if you compute the slope of the curve in which you are interested you will obtain a curve which often turns before the curve you wish to forecast.

The job of outguessing the future is so difficult and so important that you should not scorn any method which works. Preferably you should use many methods. If you do, each can check the others.

Happy Hunting! Edward R. Dewey
DIRECTOR

P. S. I have just developed what seems to be an *improvement* of the Geisinger Indicator. I will tell you about it in our next report.

Research

THE 5.91-YEAR CYCLE IN COTTON PRICES

Summary: A 5.91-year cycle has characterized cotton prices for 224 years. It has continued after discovery. It is now going down. It is due, ideally, to reach its low in the crop year 1955-56.

A seemingly identical cycle has been found in the alternate thickness and thinness of tree rings and in sunspots with alternate cycles reversed. It seems to be something pretty fundamental.

COTTON PRICES have evidenced a 5.91-year cycle for as far back as there are figures. This cycle is now on the down grade. It is due to reach its low in the crop year 1955-56. It is then due to go up again for a high in 1958-59. It is a factor which should be taken into account in attempting to forecast the price of cotton.

I told you all about this cycle in a 23 page report we issued in 1949. (A few copies of this report are still available. Price $1.00)

Except for the Revolutionary War period, prices of cotton are available from 1731 to date—a period of nearly 224 years. This period of time gives opportunity for about 38 repetitions of the cycle. Behavior which persists over so long a period of time can not reasonably be the result of random forces.

Gain of 1,424%

In trading on this or any other cycle common sense dictates that you should not assume a short position during a war. This means that you would not have gone short in 1813-14, in 1861-62, or in 1943-44.

Not counting these three transactions (and ignoring the Revolutionary War period because we have no figures for those years), trading on the basis of this cycle, 1731-32 to date would have shown a net gain of 1,424%

Of the 70 transactions, 55 would have shown gains, 15 would have shown losses. Since 1902 there would have been *no* losses trading as above. In particular, the two *forecasted* turns unfolded as predicted. They yielded a hypothetical profit of 8.6% in 1950, 8.5% in 1953, respectively. Total gains on the above basis from 1902 through the last completed transaction would have been 670%.

How the Forecast Came Out

The way in which the forecast, made in 1949, turned out is worth detailing. I told you that, if this cycle continued, the odds favored a decline in prices from the crop year 1946-47 to the crop year 1949-50. It occurred. I told you that the odds favored a rise in prices from the crop year 1949-50 to the crop year 1952-53. It occurred. I told you that the odds favored a decline in prices from the crop year 1952-53 to the crop year 1955-56. Whether this will occur is on the laps of the gods, but the average price for 1953-54 was 2.9% below the average price for 1952-53.

The reason the cycle has been working better for the past 50 years seems to be due to the concurrent presence of three other cycles of nearly this same length, The other indicated lengths are 5.575 years (66.9 months), 6.11 years (73.3 months), and 6.45 years (77.4 months).

E.R.D.

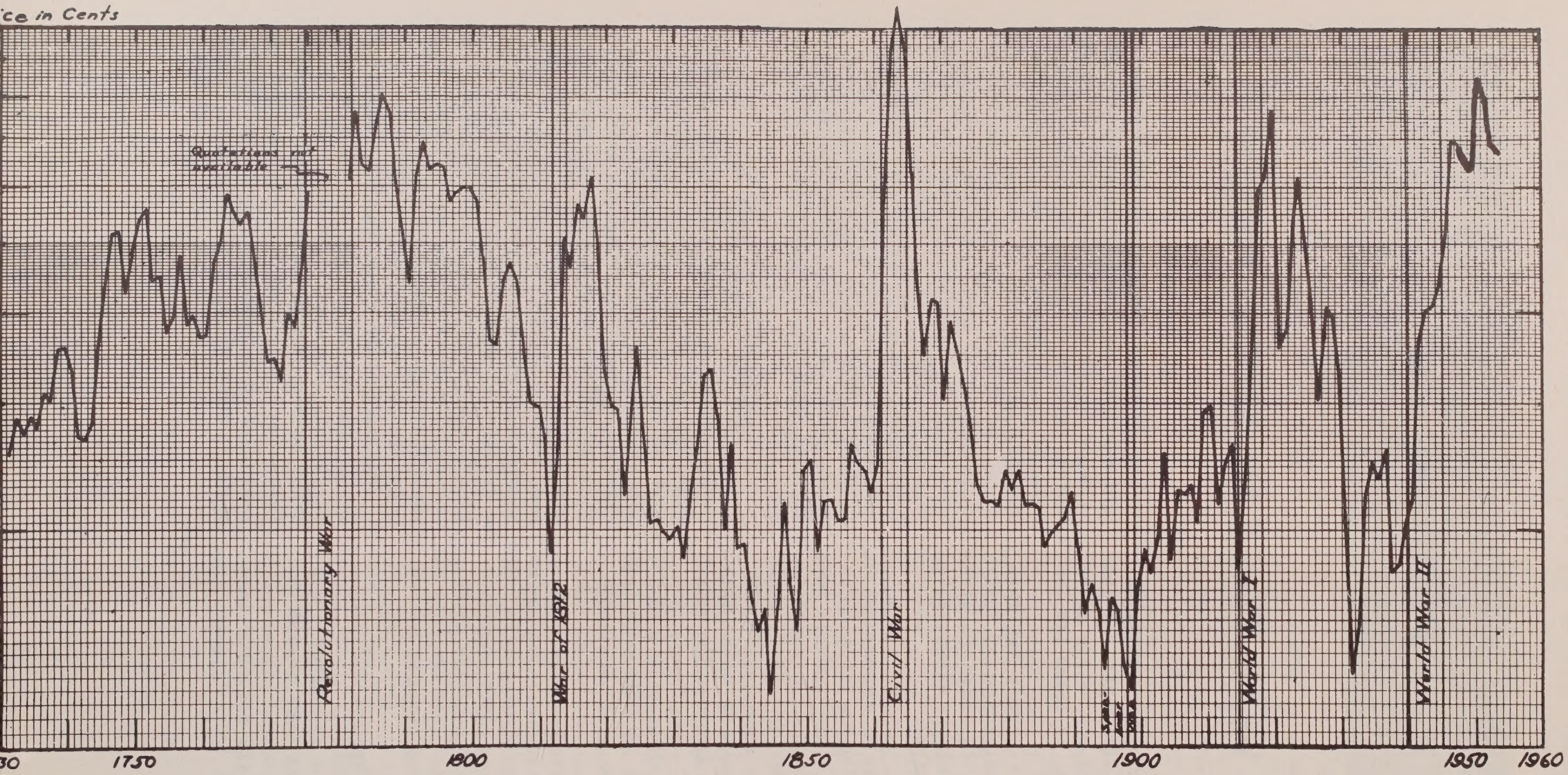


CHART 1
AVERAGE ANNUAL SPOT PRICE OF COTTON PER POUND
CROP YEARS 1731-2 TO 1953-4
(BEHAVIOR SINCE THE ORIGINAL STUDY OF 1949 IS SHOWN BY A HEAVY LINE.)
(RATIO SCALE)

Notes

Prices from August, 1731, through July, 1798, are quoted at Philadelphia.

Prices from August, 1798, through December, 1940, are quoted at New York.

Prices from January, 1941, through July, 1954, are the average for ten markets.

Data from January, 1862, through December, 1878, when the United States exchange was below par, are quoted in gold and are comparable with the rest of the data which are quoted in currency.

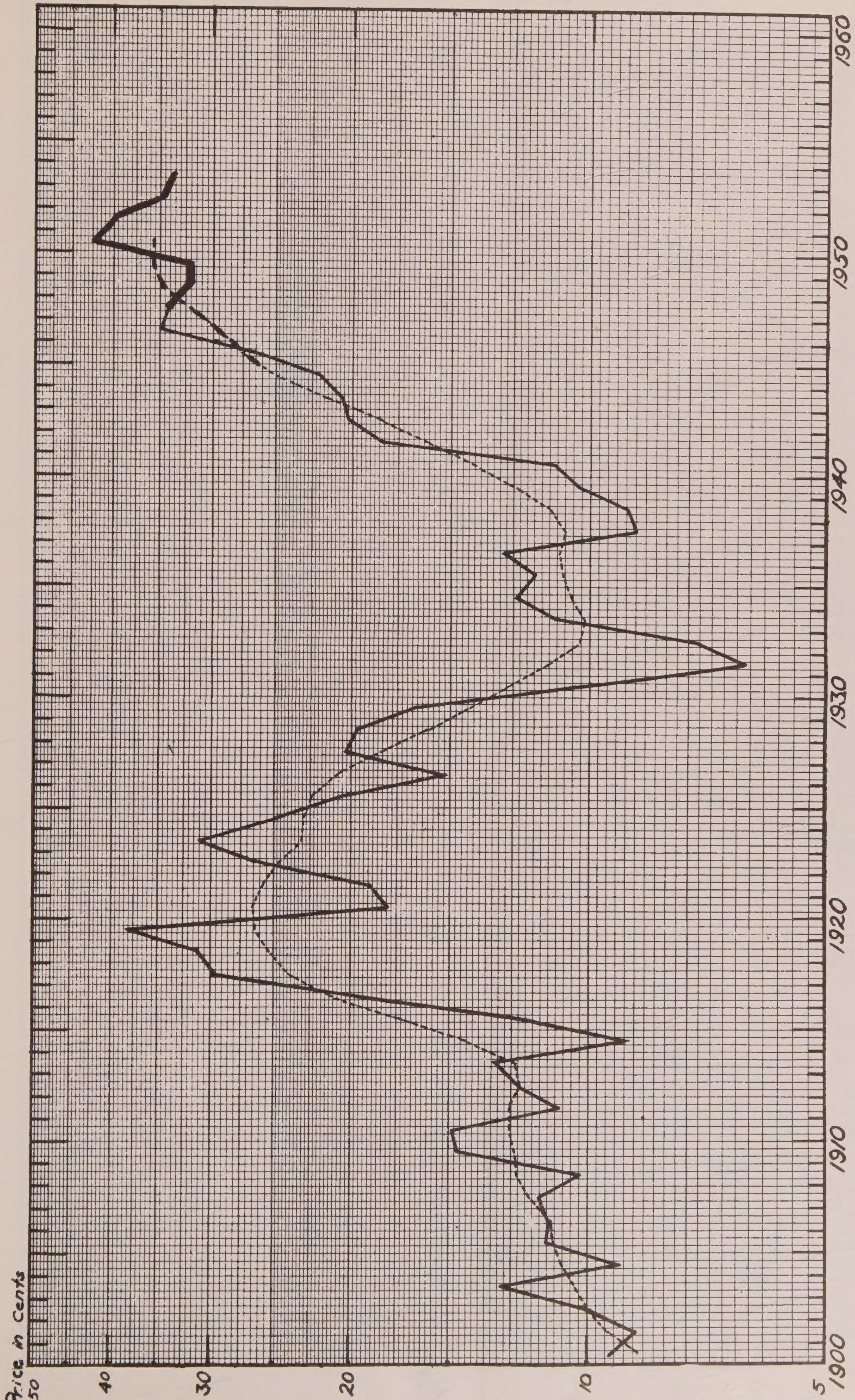


CHART 2

AVERAGE ANNUAL SPOT PRICE OF COTTON PER POUND. CROP YEARS 1900-1 TO 1953-4
TOGETHER WITH A 6-YEAR MOVING AVERAGE TREND OF THE DATA
(BEHAVIOR SINCE THE ORIGINAL STUDY OF 1949 IS SHOWN BY A HEAVY LINE.)

(RATIO SCALE)

—— **Price of Cotton**

----- **6-Year Moving Average Trend**

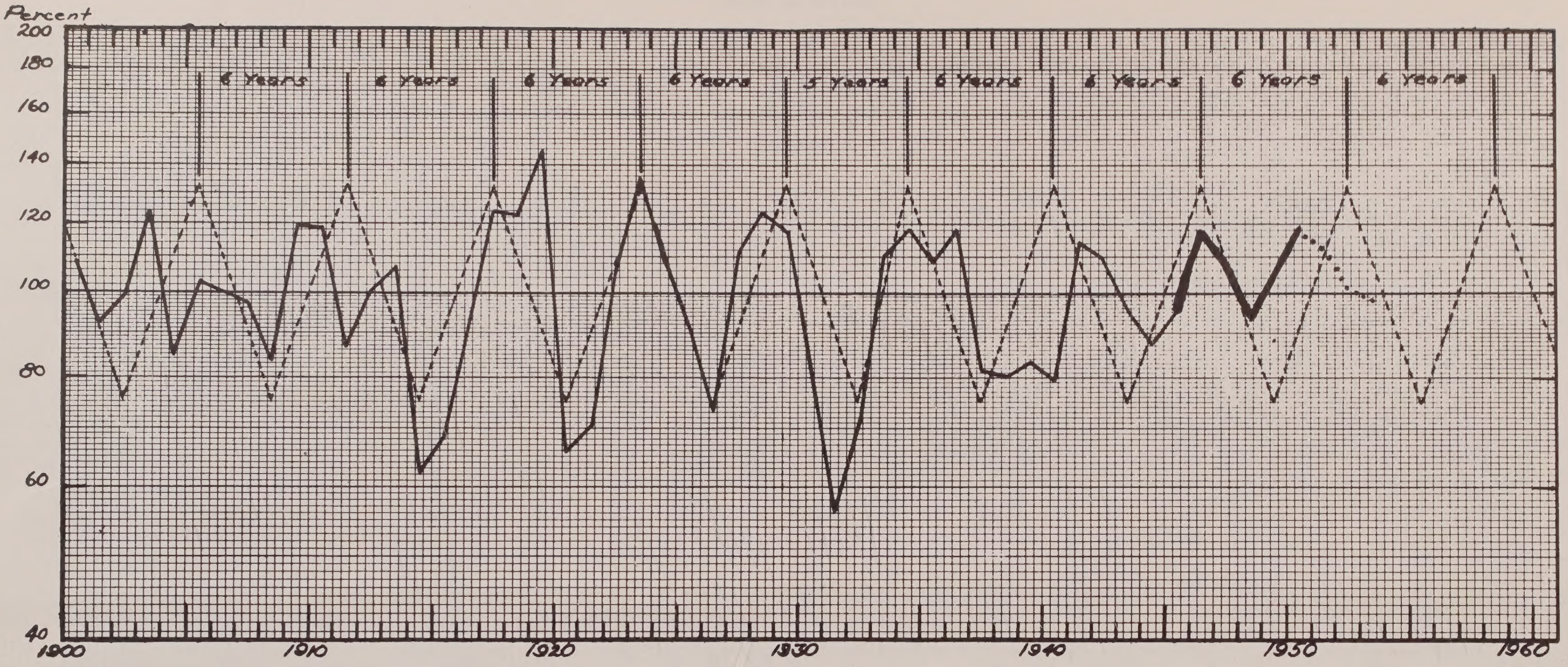


CHART 3

5.91-YEAR PATTERN IN THE AVERAGE ANNUAL SPOT PRICE OF COTTON PER POUND

(BEHAVIOR SINCE THE ORIGINAL STUDY OF 1949 IS SHOWN BY A HEAVY LINE.)

(DOTTED LINE 1951-2 TO 1953-4 REPRESENTS PERCENTAGES FROM ESTIMATED TREND.)

(RATIO SCALE)

—— **Price of Cotton Expressed as a Percentage of the 6-Year Moving Average Trend**

----- **Diagrammatic Representation of the 5.91-Year Repetitive Pattern (Ten 6-year intervals and one 5-year interval and repeat)**

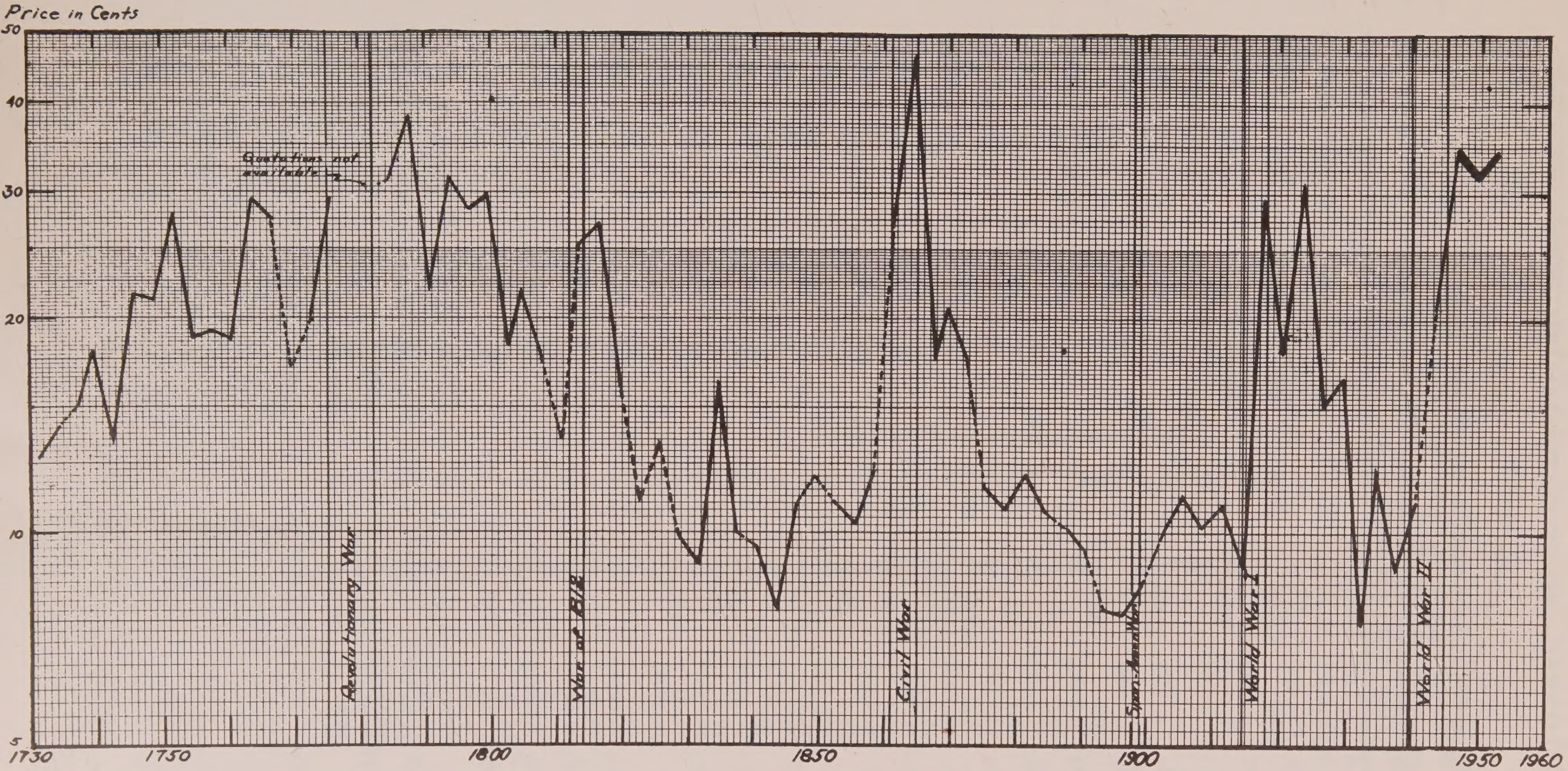


CHART 4
DIAGRAM SHOWING GAINS MADE AND LOSSES SUSTAINED
BY BUYING AND SELLING COTTON ACCORDING TO
THE REGULARLY RECURRING 5.91-YEAR PATTERN
CROP YEARS 1731-2 TO 1953-4
(BEHAVIOR SINCE THE ORIGINAL STUDY OF 1949 IS
SHOWN BY A HEAVY LINE.)
(RATIO SCALE)

——— Gain ------ Loss

TABLE 1

AVERAGE ANNUAL SPOT PRICE OF COTTON PER POUND
CROP YEATS 1731-2 TO 1953-4

(VALUES WHICH HAVE UNFOLDED FROM THE TIME OF THE ORIGINAL STUDY ARE SHOWN IN BOLDFACE TYPE.)

Crop Year	Cents per Pound
1731-32	12.7
-33	14.3
-34	13.6
-35	14.3
-36	13.8
-37	15.5
-38	15.1
-39	17.8
-40	17.8
-41	16.7
1741-42	13.4
-43	13.3
-44	14.0
-45	17.5
-46	21.5
-47	25.7
-48	25.8
-49	21.2
-50	24.0
-51	26.8
1751-52	27.9
-53	22.1
-54	22.4
-55	18.7
-56	19.7
-57	24.0
-58	19.2
-59	19.8
-60	18.5
-61	18.6
1761-62	23.4
-63	25.1
-64	29.2
-65	27.6
-66	26.3
-67	27.5
-68	23.4
-69	20.2
-70	17.1
-71	17.3
1771-72	16.1
-73	20.0
-74	19.1
1774-75	23.8
1775-76	29.4
-77	-
-78	-
-79	-
-80	-
-81	-
1781-82	30.5
-83	38.2
-84	32.0
-85	31.4
-86	35.9
-87	40.2
-88	38.2
-89	30.5
-90	26.3
-91	21.9
1791-92	30.6
-93	34.6
-94	31.6
-95	32.2
-96	31.8
-97	28.5
-98	29.4
-99	29.8
-00	29.9
-01	28.7
1801-02	24.00
-03	18.30
-04	18.08
-05	22.00
-06	23.50
-07	22.08
-08	17.75
-09	15.00
-10	14.83
-11	13.58
1811-12	9.33
-13	13.00
-14	25.50
-15	23.08
-16	28.33
-17	27.06
1817-18	30.99
1818-19	24.67
-20	16.52
-21	14.88
1821-22	14.69
-23	11.18
-24	14.65
-25	17.92
-26	13.38
-27	10.20
-28	10.34
-29	9.89
-30	9.72
-31	10.14
1831-32	9.12
-33	11.40
-34	13.06
-35	16.29
-36	16.72
-37	14.36
-38	10.02
-39	13.22
-40	9.41
-41	9.58
1841-42	8.13
-43	7.24
-44	7.82
-45	5.88
-46	7.77
-47	10.89
-48	8.54
-49	7.24
-50	12.02
-51	12.57
1851-52	9.30
-53	10.98
-54	11.01
-55	10.31
-56	10.33
-57	13.18
-58	12.46
-59	12.12
-60	11.27
1860-61	12.27
1861-62	27.29
-63	46.98
-64	54.15
-65	46.98
-66	31.40
-67	22.94
-68	17.48
-69	20.92
-70	20.72
-71	15.16
1871-72	19.54
-73	17.64
-74	15.51
-75	13.87
-76	11.51
-77	10.94
-78	10.95
-79	10.82
-80	12.13
-81	11.36
1881-82	12.09
-83	10.81
-84	10.87
-85	10.74
-86	9.47
-87	9.91
-88	10.15
-89	10.44
-90	11.27
-91	9.48
1891-92	7.68
-93	8.45
-94	7.75
-95	6.38
-96	8.10
-97	7.71
-98	6.40
-99	6.00
-00	8.36
-01	9.38
1901-02	8.73
-03	9.96
1903-04	12.84
1904-05	9.09
-06	11.30
-07	11.24
-08	11.53
-09	10.23
-10	14.66
-11	14.87
1911-12	10.85
-13	12.29
-14	13.21
-15	-
-16	11.98
-17	19.28
-18	29.58
-19	31.01
-20	38.29
-21	17.89
1921-22	18.92
-23	26.24
-24	31.11
-25	24.74
-26	20.53
-27	15.15
-28	20.42
-29	19.73
-30	16.60
-31	10.38
1931-32	6.34
-33	7.37
-34	11.09
-35	12.44
-36	11.75
-37	12.93
-38	8.75
-39	8.99
-40	10.34
-41	11.1
1941-42	18.3
-43	20.2
-44	20.6
-45	21.9
-46	26.0
-47	34.8
-48	34.6
-49	**32.2**
-50	**31.8**
-51	**42.6**
1951-52	**39.4**
-53	**34.5**
-54	**33.5**

TABLE 2

GAINS MADE AND LOSSES SUSTAINED BY BUYING AND SELLING COTTON
ACCORDING TO THE REGULARLY RECURRING 5.91-YEAR PATTERN CROP YEARS 1731-2 TO 1953-4
(TRANSACTIONS SINCE THE ORIGINAL STUDY OF 1949 ARE SHOWN IN BOLDFACE TYPE.)

Buy Years	Sell Years	Buy-Sell Gain (Percent)	Short-Cover Gain (Percent)	Round Trip Net Gain (Percent)
1731-2				
	1734-5	13%		
1737			- 6%	7%
	1739	18		
1742			25	43
	1745	52		
1748			1	63
	1751	32		
1754			33	65
	1757	3		
1760			3	6
	1763	57		
1766			6	63
	1769	-38		
1772			-17	-55
	1775	47		
1778			a	a
	1781	a		
1784			- 3	44
	1787	22		
1790			43	65
	1793	44		
1796			10	54
	1799	5		
1802			39	44
	1804	20		
1807			19	39
	1810	-24		
1813			b	-24
	1816	6		
1819			39	45
	1822	-32		
1825			-20	-52
	1828	-26		
1831			8	-18
	1834	79		
1837			39	118
	1840	- 4		
1843			19	15
	1846	40		
1849			-10	30
	1852	- 8		
1855			6	- 2
	1858	18		
1861			b	18
	1864	72		
1867			63	135
	1869	18		
1872			15	33
	1875	-35		
1878			6	-29
	1881	12		
1884			12	24
	1887	- 5		
1890			7	2
	1893	-18		
1896			1	-17
	1899	9		
1902			-19	-10
	1905	13		
1908			10	23
	1911	7		
1914			18	25
	1917	233		
1920			39	272
	1923	74		
1926			51	125
	1929	9		
1932			55	64
	1934	68		
1937			29	97
	1940	26		
1943-4			c	26
	1946-7	69		69
Total		886%	521%	1407%
1949-50			**9.6**	***77.6**
	1952-3	**8.5**		**8.5**
Grand Total		**994.5**	**529.6**	**1424.1**

a No quotations for Revolutionary War period.
b No short position assumed because of war
c No short position assumed because of war.

*INCLUDING THE BUY-SELL GAIN FROM 1943-4 TO 1946-7 AS SHOWN ABOVE.

CYCLES IN SUNSPOT NUMBERS

SOME startling discoveries in regard to cycles have just been made by G. T. Lane of Rochester, New York.* His findings are the result of an intensive study of the variations of sunspot numbers during the past 200 years.

Lane's discoveries are important because they throw a certain amount of light on the cause of sunspots. They may help us to predict the future increase and decrease of sunspots. Thus they may help us to predict the various earthly events that tend to correspond to sunspot behavior.

In brief, Lane's discoveries are—

Lane's Four Discoveries

One: He finds that, for the period studied, the average length of the *main* sunspot cycle bears a simple relationship to the movements of the planets Saturn & Uranus.

Two: He finds that certain irregularities in the length of the main sunspot cycle correspond to irregularities in the movements of Saturn and Uranus. (The movements of Saturn and Uranus are irregular because their orbits are eliptical in shape instead of circular.)

Three: He finds that one of the minor sunspot cycles bears a simple relationship to the movements of the planets Saturn and Jupiter.

Four: He finds several other minor cycles present on the average in the number of sunspots. He finds that these cycles mostly have lengths which are very close to simple unit fractions of the same fundamental length.

Thus, with these discoveries of Lane, we get the beginning of order out of what, hitherto, has been but chaos.

The Sunspot Cycle

Now, more in detail: The number of sunspots fluctuates in cycles which range from 7½ to 16¾ years in length. These cycles average a little over 11 years long. The average length of the cycle depends of course on the particular span of time over which the averaging is done. If you choose a span which includes an excess of long cycles the average cycle length will be long. And vice versa. The average cycle length is usually set between 11.1 and 11.4 years.

The length of the average cycle also depends upon the method of averaging you use, but this is a complication which we do not need to get into here.

Planetary Correspondence

Using more refined methods than ever used before, Lane finds that, *over the period of time for which figures are available,* the average length of the main sunspot cycle is 11.25 years. Now, over the same length of time, the quarter "synodic period" of Saturn and Uranus is just over 11.25 years. This is a very curious coincidence.

The synodic period of two planets is the length of time between two successive "conjunctions." A conjunction of two planets occurs when the two planets line up with each other and with the sun.

(The word conjunction is also used to describe the lining up of two planets and the earth. Conjunctions looked at from the point of view of the sun are called "heliocentric" conjunctions—that is, conjunctions with the sun at the center. When looked at from the point of view of the earth, conjunctions are called "geocentric" conjunctions—that is, conjunctions with the earth at the center. Here we are talking about heliocentric conjunctions.)

***Editor's Note.** FOR A COMPLETE ACCOUNT OF LANE'S ANALYSIS OF SUNSPOT NUMBERS AND THE DISCOVERIES WHICH DEVELOPS YOU SHOULD REFER TO AN ARTICLE IN VOL. 3 NO. 1 OF THE QUARTERLY *Journal of Cycle Research*. YOU CAN BUY THIS PUBLICATION FROM THE FOUNDATION FOR THE STUDY OF CYCLES, 680 WEST END AVENUE, NEW YORK 25, NEW YORK FOR $1 25 A COPY ALSO, IF YOU WISH, YOU CAN SUBSCRIBE TO THE JOURNAL. JUST SEND YOUR CHECK FOR $5.00 FOR A YEAR'S SUBSCRIPTION.

The Bird's Eye View

To make the matter clearer imagine yourself looking down upon the solar system. The sun is at the center. The planets are rotating around it. Two of the planets, Saturn and Uranus are lined up with each other and with the sun in heliocentric conjunction as in Fig. A. The revolutions proceed. Saturn pulls ahead. In 29.46 years Saturn makes a full lap. See Fig. B. Then she starts to catch up with Uranus from behind. Eventually she overtakes her. See Fig. C. Again, the two planets line up with each other and sun. Another heliocentric conjunction has occurred. Exactly 45.36 years have elapsed, on the average, since the sun and the two planets were in line before. This interval of time is the synodic period of the two planets. One quarter of the synodic period of Saturn and Uranus is 11.34 years.

Because the orbits of both Saturn and Uranus are eliptical, their synodic periods (and of course their quarter synodic periods too), vary a good deal in length. Actually, the quarter synodic periods range from 9.6 to 13.5 years in length. The length depends upon what part of their orbit the planets are in when the conjunctions take place. For the two hundred years for which sunspots figures are available, the length of the quarter synodic period of Saturn and Uranus is 11.25 years. This is just the length of the sunspot cycle for the same period!

Irregularities Agree Too

Lane found this coincidence provocative. You or I also would have sat up and taken notice if we had been the first to observe it. But of course the behavior might be merely coincidence. Therefore, Lane tested further. He found that when the quarter synodic period of Saturn and Uranus was long, the sunspot cycle tended to be long; when the quarter synodic period of Saturn and Uranus was short, the sunspot cycle tended to be short! Thus, in addition to having the same *average* length over the period studied, the sunspot cycles and the quarter synodic periods of Saturn and Uranus tended to have the same *irregularities* too! This correspondence is quite startling. It is hard to explain such behavior unless there is some inter-relationship between the two phenomena.

I shall tell you more about Lane's other discoveries in an early report.

E.R.D.

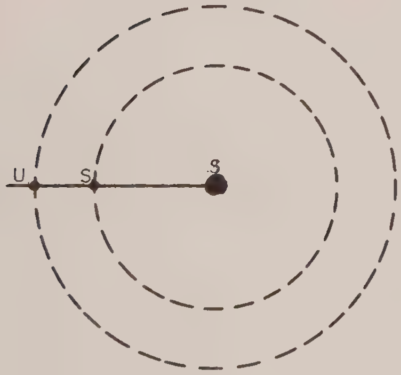


Fig. A

A heliocentric conjunction of Uranus and Saturn. It will take Saturn 29.46 years to make a complete revolution around the sun and get back to the same position. It will take Uranus 84.01 years.

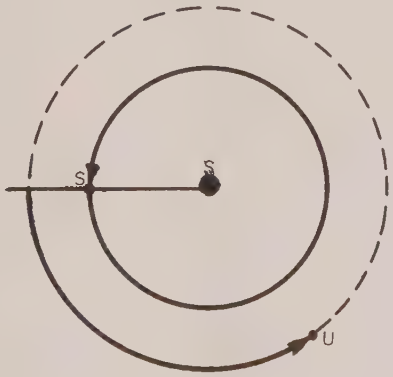


Fig. B

Position of the planets 29.46 years after Fig. A. Saturn has made one complete revolution (a sidereal period) and Uranus has made 29.46/84.01 (about 7/20) of a revolution.

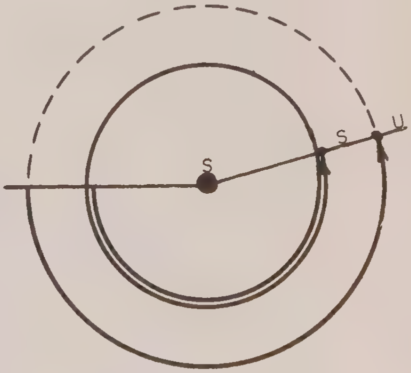


Fig. C

Position of the planets 45.36 years after Fig. A. Saturn has caught up with Uranus, creating another heliocentric conjunction. This interval of 45.36 years is the synodic period of Uranus and Saturn.

CYCLES IN AUTOMOBILE SALES--CONTINUED

Summary: The 3.4-year (41-month) cycle in factory sales of passenger cars is now on the way down. This fact should be taken into account in estimating sales for 1955.

The fact that this cycle reasserted itself after the war in accordance with the timing established before the war gives added evidence of its significance.

THE post-war behavior of passenger automobile production is truly remarkable. The 41-month (3.4-year) cycle reasserted itself *in correct timing* even though production was completely suspended during the war.

To me, the continuation of this strong 41-month cycle suggests the possibility of some regular environmental force with a wave length of 41 months, which acts upon the human beings who buy cars.

The 3.4-Year (41-Month) Cycle

In our August--September report I told you a little about the 3.4-year (41-month) cycle in automobile production. The study reported upon there was based on annual figures and hence was pretty crude. Therefore, using monthly figures, I did the job over for you. I got the following results:

The length remains unchanged at 3.4 years (41 months).

The strength at month of high is typically 125% of trend. At month of low the cycle is typically at 80% of trend.

The work with monthly figures gives us *ideal* turning points as follows: Last low, June 1952, next low, November 1955. Last high midway between February & March 1954. Of course, as you know, the *actual* high is usually distorted one way or the other by other cycles and/or random events.

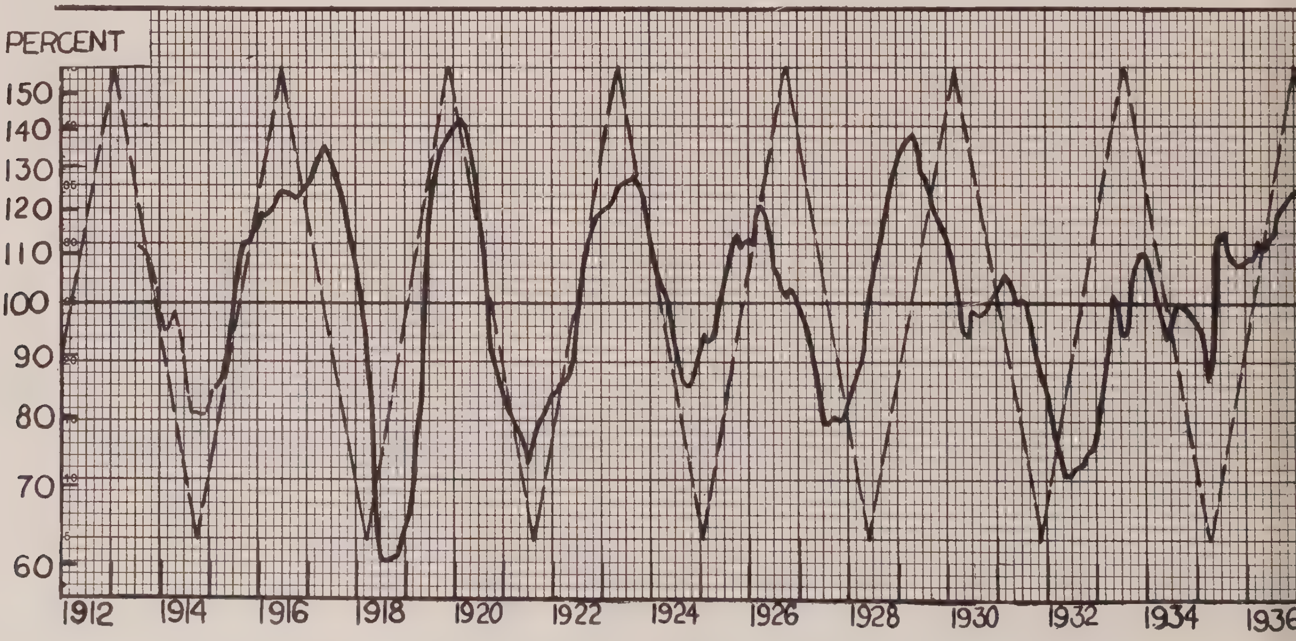


Fig. 2. The 3.4-Year (41-month) Cycle in Factory Sales of Passenger Cars. (Ratio Scale.)

This curve shows sales as percentages of trend. The gap 1942-45 was caused by World War II.

The ends of the curve are shown by broken lines because trend for

The 33-Month Cycle

The work with monthly figures reveals the existence of what is probably a 33-month cycle along with the 41-month cycle. That is to say, the figures act as they would act if they were influenced at one and the same time by two different cyclic forces, one 3.4 years (41 months) long, one about 2 3/4 years (33 months) long.

The 33-month cycle is not as strong as the 41-month cycle, but it is pretty strong. I shall tell you more about it in another report.

6 & 13 Year Cycles Also

Unless you are a brand new member, you will doubtless remember that automobile production has also been characterized by 6-year and 13-year cycles, as well as by the cycle 3.4 years long.

Fig. 3 diagrams all three of these cycles separately and in combination. It also shows you the residual. The residual is a combination of growth, accidental variation, and other cycles not as yet isolated. I have run a broken line through this residual to approximate trend.

Fig. 4 shows a synthesis or combination of the trend and the three cycles already isolated. It also shows you, for comparison, the original data.

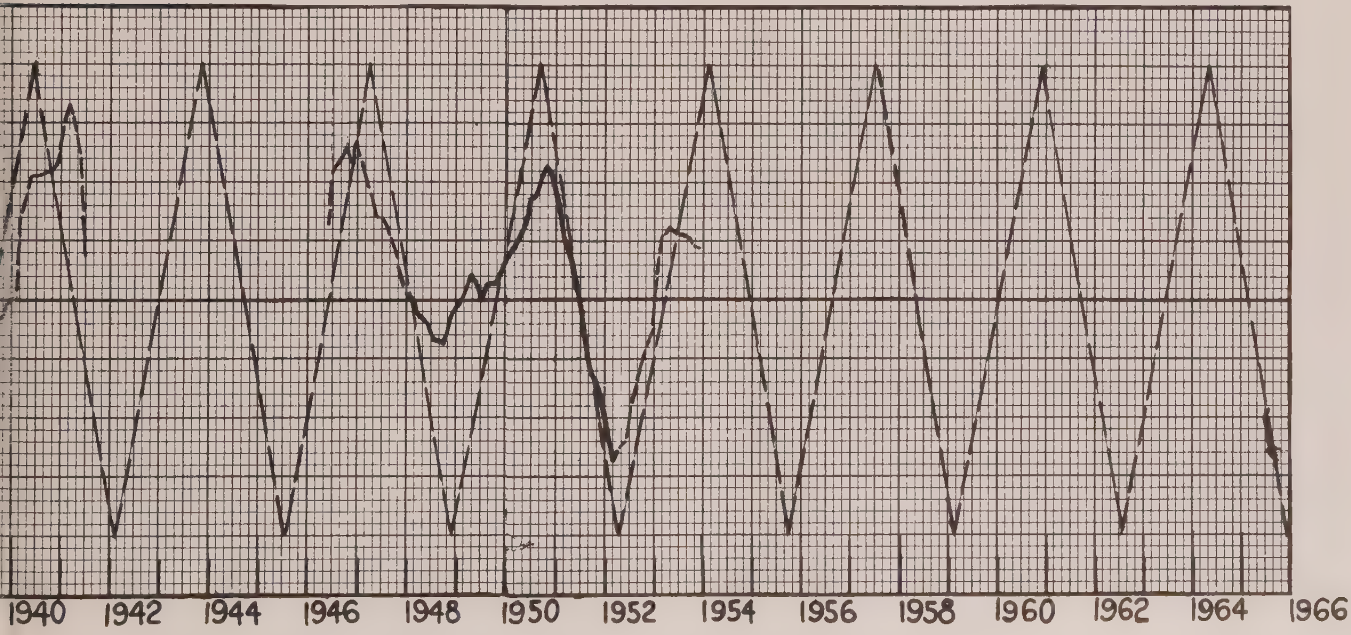
As you can see, there are a number of places where trend and the three cycles do not fully account for the actual behavior. Other cycles and random factors such as war, have exerted distorting influences. Similar distortions must be expected in the future.

Lower Sales Ahead

When I undertook this study for you I hoped that by now I would have a pretty good idea of the probable future course of factory sales of passenger cars. However, I do not. The picture is too complex. The three isolated cycles only *partly* explain the past behavior. There is no hope that, at best, they alone can do more than forecast *part* of the future.

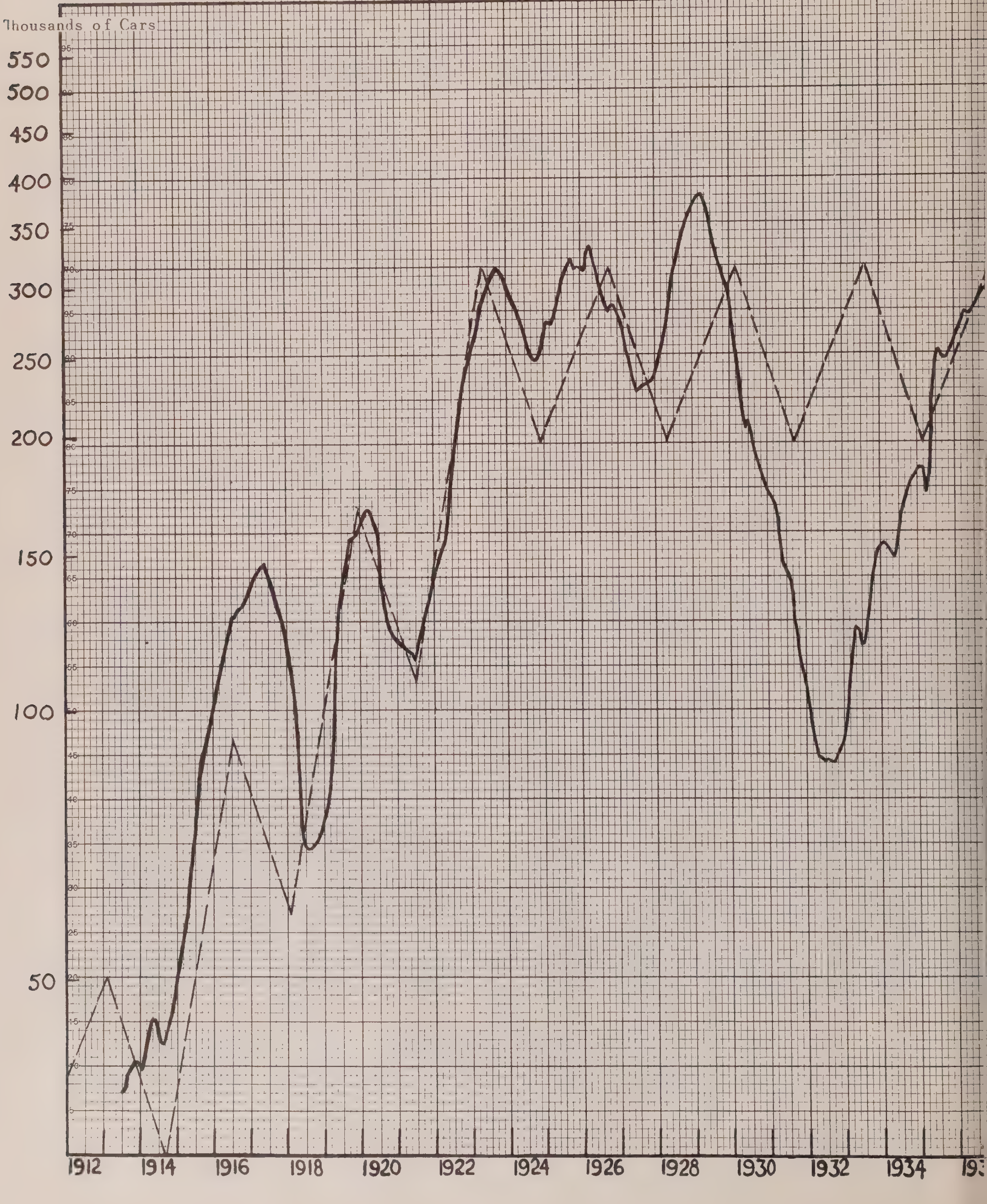
On the other hand, a study of Chart 2 shows you that the total for the year centering at or about the low of the 41-month cycle has *always* been below trend, and usually by very substantial amounts.

E.R.D.



these months had to be estimated.

The zigzag line diagrams the timing of an ideal 3.4-year (41-month) cycle. This diagram projects this cycle into the future to indicate coming ups and downs if this cycle continues.


Thousands of Cars
550
500
450
400
350
300
250
200
150
100
50
1912
1914
1916
1918
1920
1922
1924
1926
1928
1930
1932
1934
193

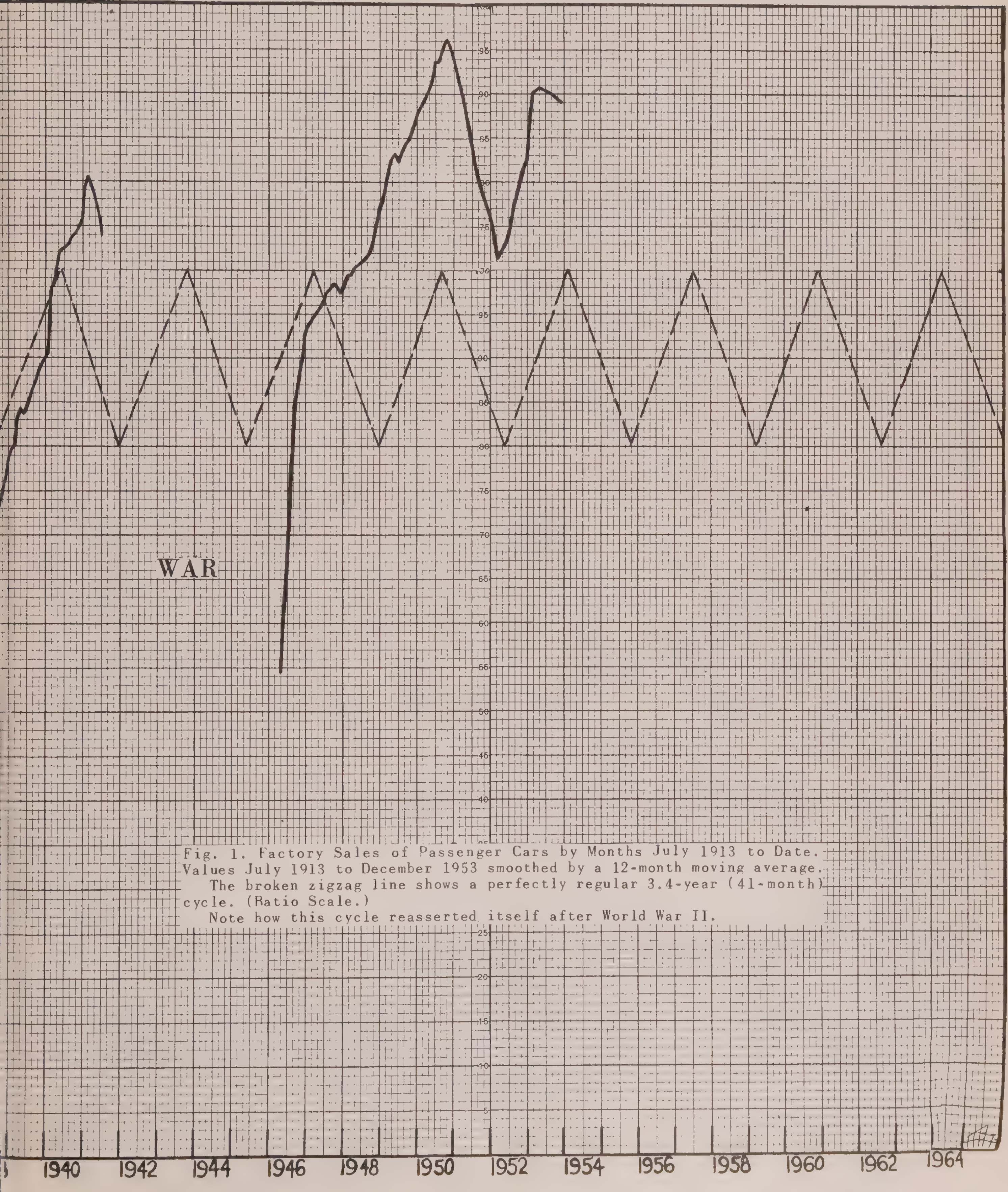


Fig. 1. Factory Sales of Passenger Cars by Months July 1913 to Date. Values July 1913 to December 1953 smoothed by a 12-month moving average.

The broken zigzag line shows a perfectly regular 3.4-year (41-month) cycle. (Ratio Scale.)

Note how this cycle reasserted itself after World War II.

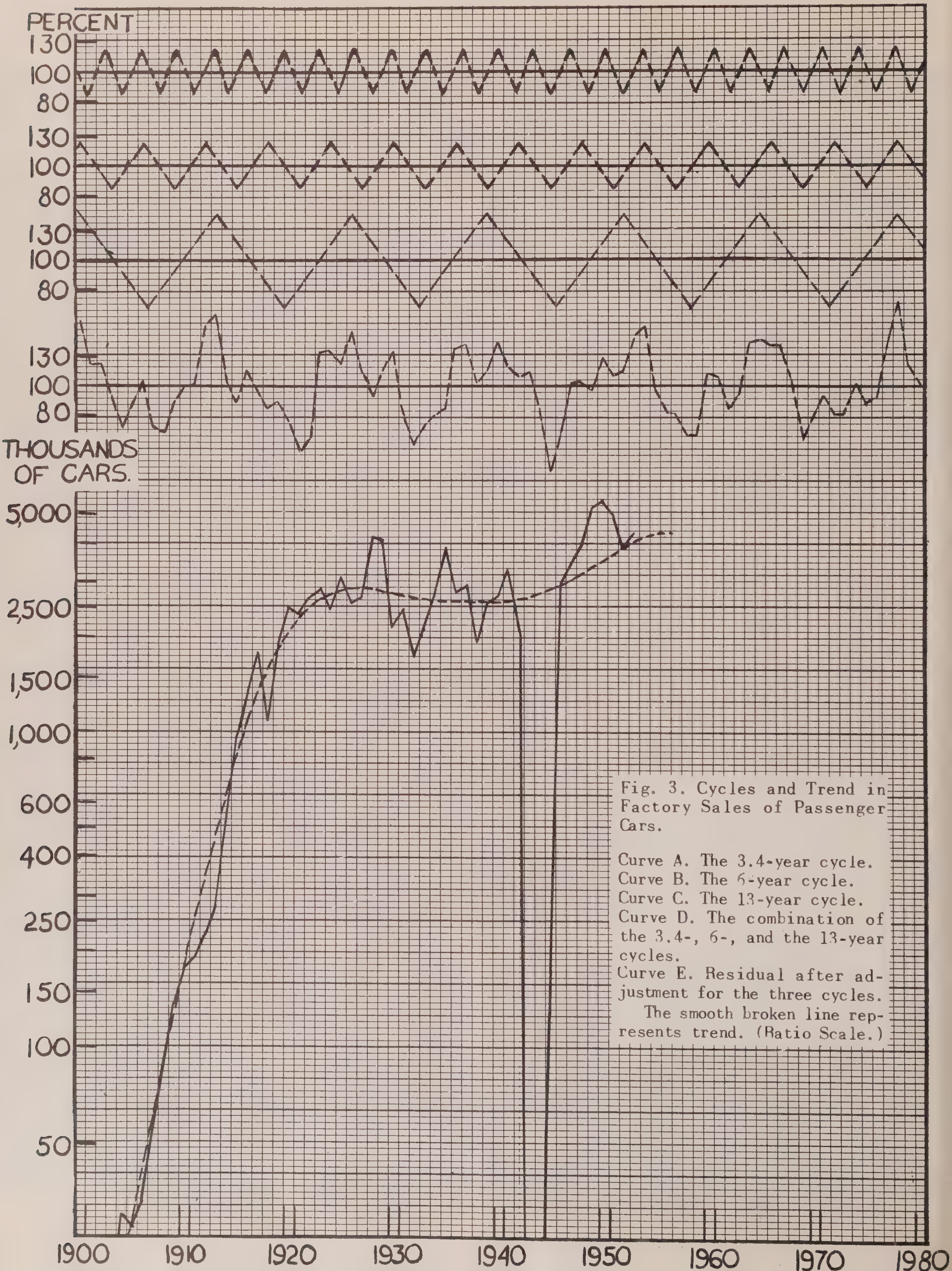


Fig. 3. Cycles and Trend in Factory Sales of Passenger Cars.

Curve A. The 3.4-year cycle.
Curve B. The 6-year cycle.
Curve C. The 13-year cycle.
Curve D. The combination of the 3.4-, 6-, and the 13-year cycles.
Curve E. Residual after adjustment for the three cycles.

The smooth broken line represents trend. (Ratio Scale.)

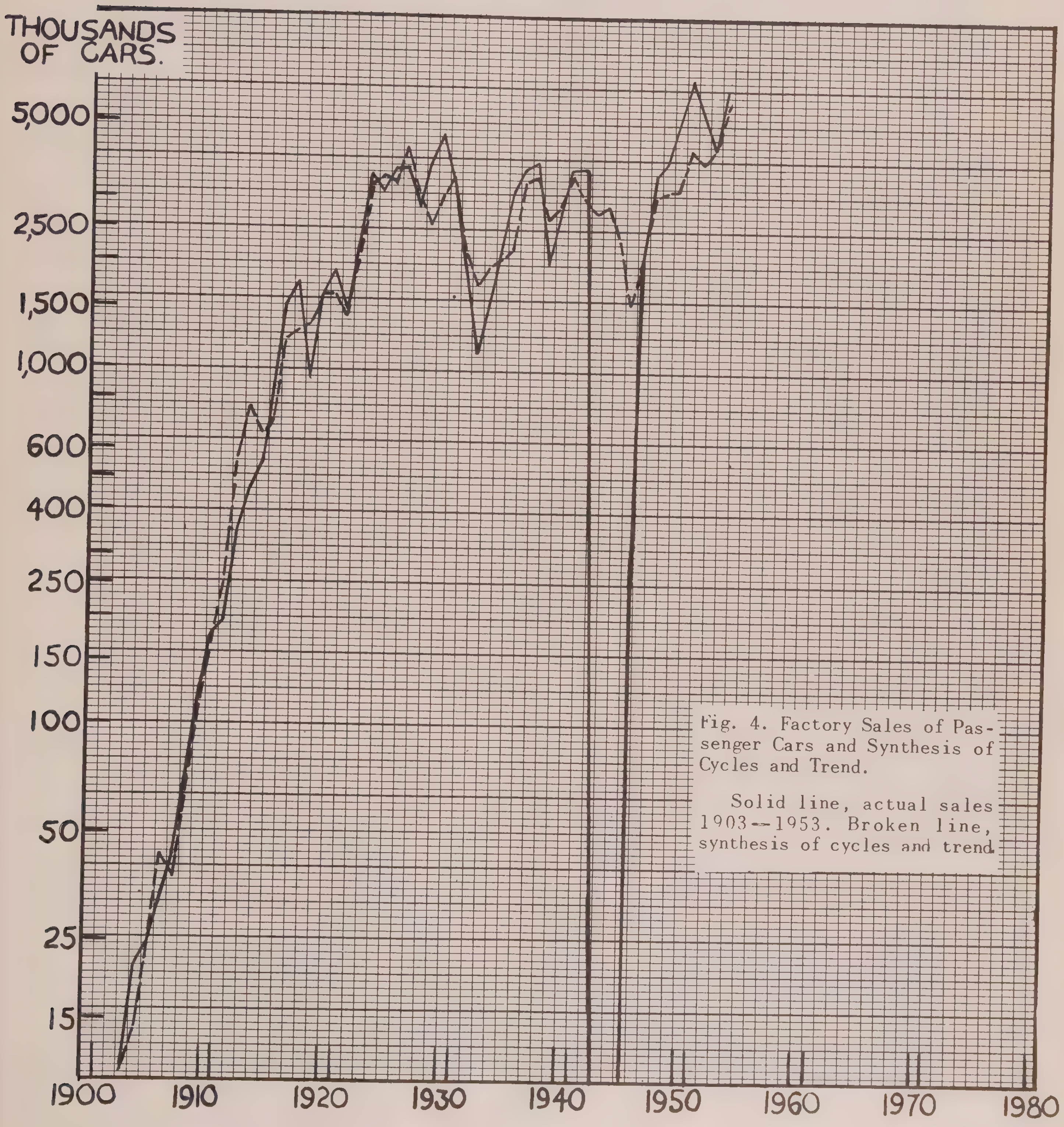


Fig. 4. Factory Sales of Passenger Cars and Synthesis of Cycles and Trend.

Solid line, actual sales 1903—1953. Broken line, synthesis of cycles and trend.

Letters

Wholesale Prices Wanted

Dear Mr. Dewey:

I am particularly interested in studying the trends and cycles in the drug business. Data are difficult to collect in this field, and I think the best I can do is select a representative group of pharmaceutical manufacturers whose annual gross incomes appear for a considerable period back in Moody's Manual. It is practically impossible to get figures on all of them because many companies, large, medium and small, are privately owned, and they never publish any year-end reports. However, I believe I can get enough data to give a good cross-section of the pharmaceutical manufacturing industry. At present, I am not interested in the "proprietary" group, only the so-called "ethical" manufacturers, i.e., those who promote their products through the medical profession and make no attempt to create final consumer demand by advertising in newspapers, magazines, on the radio and T.V.

One thing that bothers me considerably now is a proper scale of dollar values. I have at hand your data on the dollar values in terms of gold as given in the Monthly Report for June 1951, but this goes back only as far as 1926. I should like to have indexes on the dollar value as far back as 1890, if possible, based on (a) the gold dollar, (b) the 1926 dollar, (c) the 1935-39 dollar. If I have (b) or (c), I can set up the other, but I feel a bit shaky about working with the gold dollar.

If you can help me on this "dollar value" business, I shall appreciate it very much, and certainly shall feel that I am working on a solid foundation.

Considering a summation of the four major business cycles (41-month, 9-year, 18 2/3-year, and 54-year), I can't see how there can be a major depression for a long time. Can you? Maybe a bit of rough session from about 1964 to 1970, but no real crash until 1980 or 1981. (War increase in amplitudes being ignored.)

Sincerely,

Seymour, Indiana.

In Reply I Said:

Dear :

I agree with you that the sales of a group of Moody's "ethical" manufacturers would probably give the best available dollar series to show growth.

I agree with you that dollar values must be corrected if you are to get anything meaningful in the way of growth figures.

I think the best index available to you is the "Wholesale Price Index" , because the only drugs and pharmaceuticals that I know about that go back to 1890 are grain alcohol, refined glycerin, natural opium in cases, and manufacturers' quotations on quinine. These are the components of the Department of Commerce's drugs and pharmaceutial index prices from 1890 to 1911, which could be used if you wish, but I think I would rather take the broader base.

You can get available wholesale prices, 1890 to date, in almost any book of reference, such as, "Historical Statistics of the United States, 1789-1945" or the "Statistical Abstract" or by dropping a postal card to the Chicago Office of the Bureau of Foreign and Domestic Commerce.

I would rather not stick my neck out in regard to the probable date of the next major depression until I know more than I know now about cycles.

In connection with the "54-year" cycle, remember that although the low of the ideal cycle in *prices* in terms of gold centers about now, this cycle in *production* probably had its last crest from 1903 to 1910, depending on the series and its last low in the mid thirties.

Cordially yours,

More About Sunspot Cycles

Dear Mr. Dewey:

In your discussions of cycles you have occasionally referred to a possible planetary origin of variations in solar activity. In my paper on the Earth-effect in *Popular Astronomy*, March, 1949, are curves showing the northward and southward surge of the entire spotted area, being north near the equinoxes and farthest south near the solstices. I believe I was the first to study the two hemispheres separately. Similar effects may be due to the other planets, but it would seem that these diverse effects would, on the whole, tend to counteract each other.

As to the 11-year cycle, I stated in *Popular Astronomy*, December 1949, that an internal origin is evident from the wide and systematic changes in latitude of the spots and prominences during each cycle. At the minimum epoch, spots appear in high latitudes, 40°-45°, and the latitude of maximum frequency thereafter decreases, until in about 13 years they disappear near the equator. There is thus an overlap of two years, when spots in high and low latitudes coexist. The latitude of maximum frequency of the prominences increases from near the equator to around 80°-90° during 13 years. With such systematically varying shifts in latitude of both spots and prominences, it is preposterous to suppose that the 11-year cycle has an external origin.

The 30-month cycle in the mean latitude of the entire spotted area undergoes an 11-year variation in its length, and is clearly of internal origin. This cycle is evident in the variations in the length of the 3.5-month cycle in the total spottedness.

The 37-year cycle is evident in the varying lengths of the 11-year cycle, and in the ratio of the ascending to the descending branch of the curve, also in the intensity at maxima. It is also seen in the variations of the 30-month cycle.

As to the 83-year cycle in the length of the 11-year cycle, it is obvious that any possible external cause must be sought in the region of outer space. Huntington postulated this theory in one of his writings and even named a variable star in this connection. It should be noted, however, that both the 37- and 83-year cycles show a 300-year cycle in their variations. (Cf. Figs. 3, 5, and 6 in my 1933 paper.) The 300-year variation in the residuals of the actual from the normal dates of the 11-year epochs of maxima is shown by the dotted line in Fig. 4. A 1500-year variation in the lengths of the 11-, 37-, 83-, and 300-year cycles is also evident from these diagrams.

It is obvious that any theory as to the origin of variations in solar activity must take into consideration all these solar cycles, and account for their interdependence.

Sincerely yours,
H. W. Clough

Castile, New York.

Use of Cycles in Tax Cases

Dear Mr. Dewey;

On Thursday, December 10, the Associated Press had an item from Washington D. C., about a tax case that may have been concerned with cycles. An abstract include

"The U. S. Tax Court has ruled that Waldorf System Inc. is entitled to a refund of excess profits taxes under the so-called variant profits theory. ...A special tax court commissioner and the court itself held on the basis of lengthy testimony that the resturant chain qualified as an industry with a profit cycle different from the normal business cycle." Thus it is to be permitted to substitute a base period other than 1936-39.

This could be an interesting case in the practical use of business cycles. Maybe you are already acquainted with their presentation.

Sincerely,
E. G. Field

Atlanta 3, Georgia.

In Reply I Said:

Dear Mr. Field:

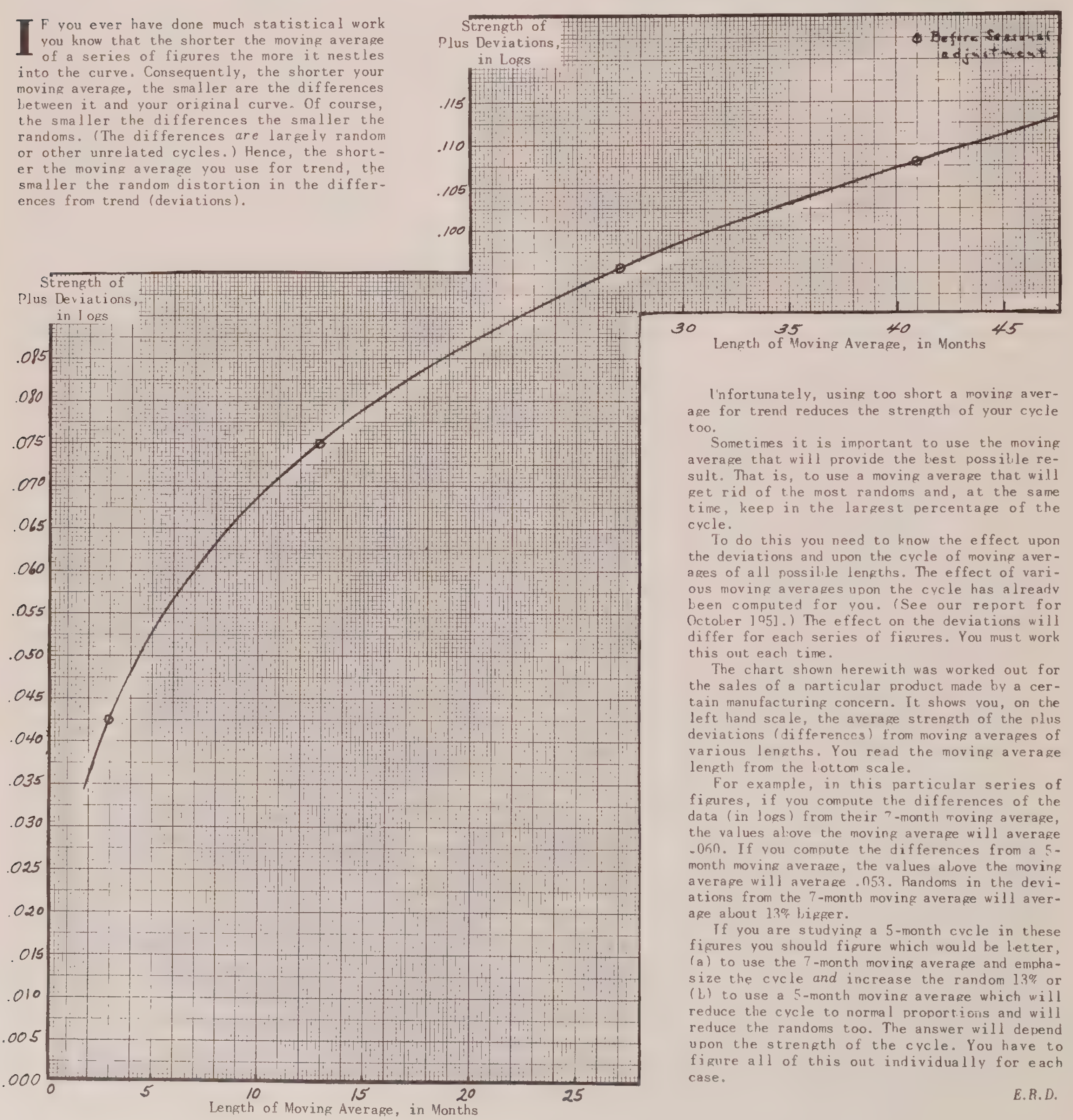
No, I am not familiar with the Waldorf presentation, but I am acquainted with the so-called variant profits theory. I should think a knowledge of cycles could be put to very profitable use along the lines indicated.

Cordially yours,

Technical

EFFECTS OF MOVING AVERAGES

If you ever have done much statistical work you know that the shorter the moving average of a series of figures the more it nestles into the curve. Consequently, the shorter your moving average, the smaller are the differences between it and your original curve. Of course, the smaller the differences the smaller the randoms. (The differences *are* largely random or other unrelated cycles.) Hence, the shorter the moving average you use for trend, the smaller the random distortion in the differences from trend (deviations).



Unfortunately, using too short a moving average for trend reduces the strength of your cycle too.

Sometimes it is important to use the moving average that will provide the best possible result. That is, to use a moving average that will get rid of the most randoms and, at the same time, keep in the largest percentage of the cycle.

To do this you need to know the effect upon the deviations and upon the cycle of moving averages of all possible lengths. The effect of various moving averages upon the cycle has already been computed for you. (See our report for October 1951.) The effect on the deviations will differ for each series of figures. You must work this out each time.

The chart shown herewith was worked out for the sales of a particular product made by a certain manufacturing concern. It shows you, on the left hand scale, the average strength of the plus deviations (differences) from moving averages of various lengths. You read the moving average length from the bottom scale.

For example, in this particular series of figures, if you compute the differences of the data (in logs) from their 7-month moving average, the values above the moving average will average .060. If you compute the differences from a 5-month moving average, the values above the moving average will average .053. Randoms in the deviations from the 7-month moving average will average about 13% bigger.

If you are studying a 5-month cycle in these figures you should figure which would be better, (a) to use the 7-month moving average and emphasize the cycle *and* increase the random 13% or (b) to use a 5-month moving average which will reduce the cycle to normal proportions and will reduce the randoms too. The answer will depend upon the strength of the cycle. You have to figure all of this out individually for each case.

E.R.D.

Questions & Answers

Question:

What is the circulation of *Cycles* and how much do you charge a page for the outside back cover?

Answer:

We have 4,200 paying members. We print about 4500 copies. The outside back cover sells for $150.

Question:

Can I still get in on the Correspondence Course?

Answer:

Yes. We found it necessary to give a separate time schedule to each person taking the course. You could therefore begin now. You would finish a little later than the others but I do not see that this would make any difference.

Question:

In your report for September 1953 you told of an amusing interchange with the post office department. They insisted that your June--July report was two reports. They refused to permit you to call your next report an August--September report.

I notice that in 1954 you got away with calling your June report June--July and your next report August--September. How come?

Answer:

In 1954 we took the matter up with a different man!

Question:

The Geisinger Industrial Indicator is pretty good. Do you know how it worked prior to 1947?

Answer:

Yes, since the August--September report I have carried this index back as far as possible. It did not work very well during the war. But I don't hold that against it.

It is impossible to continue it prior to the war because some of the components were not gathered prior to that time.

Question:

The index of lynx abundance printed on pages 250 and 251 of your August--September report differs from the index you printed on pages 10 and 11 of your report for October 1950. Why?

Answer:

The index printed in the August--September 1954 report is a brand new index prepared from old records by Dr. Leonard W. Wing, Research Fellow of the Foundation. The index I printed in 1950 was based on actual figures of the Hudson Bay Company all the way back to 1735. However, between 1820 and 1821 the Hudson Bay Company merged with the great North West Company. The new index adjusts the old figures prior to the merger in such a way as to make them comparable with the figures after the merger. The new index also makes certain minor changes and adjustments.

The makeup of the new index is described in detail on Pages 21-24 of the *Journal of Cycle Research* , Vol. 2, No. 1.

Question:

Are big companies taking more of an interest in the subject of cycles?

Answer:

Yes. Many large companies belong to the Foundation.

Also, I notice that some of the men who are taking the correspondence course are having their tuition paid by the companies for whom they work.

THE GEISINGER INDUSTRIAL

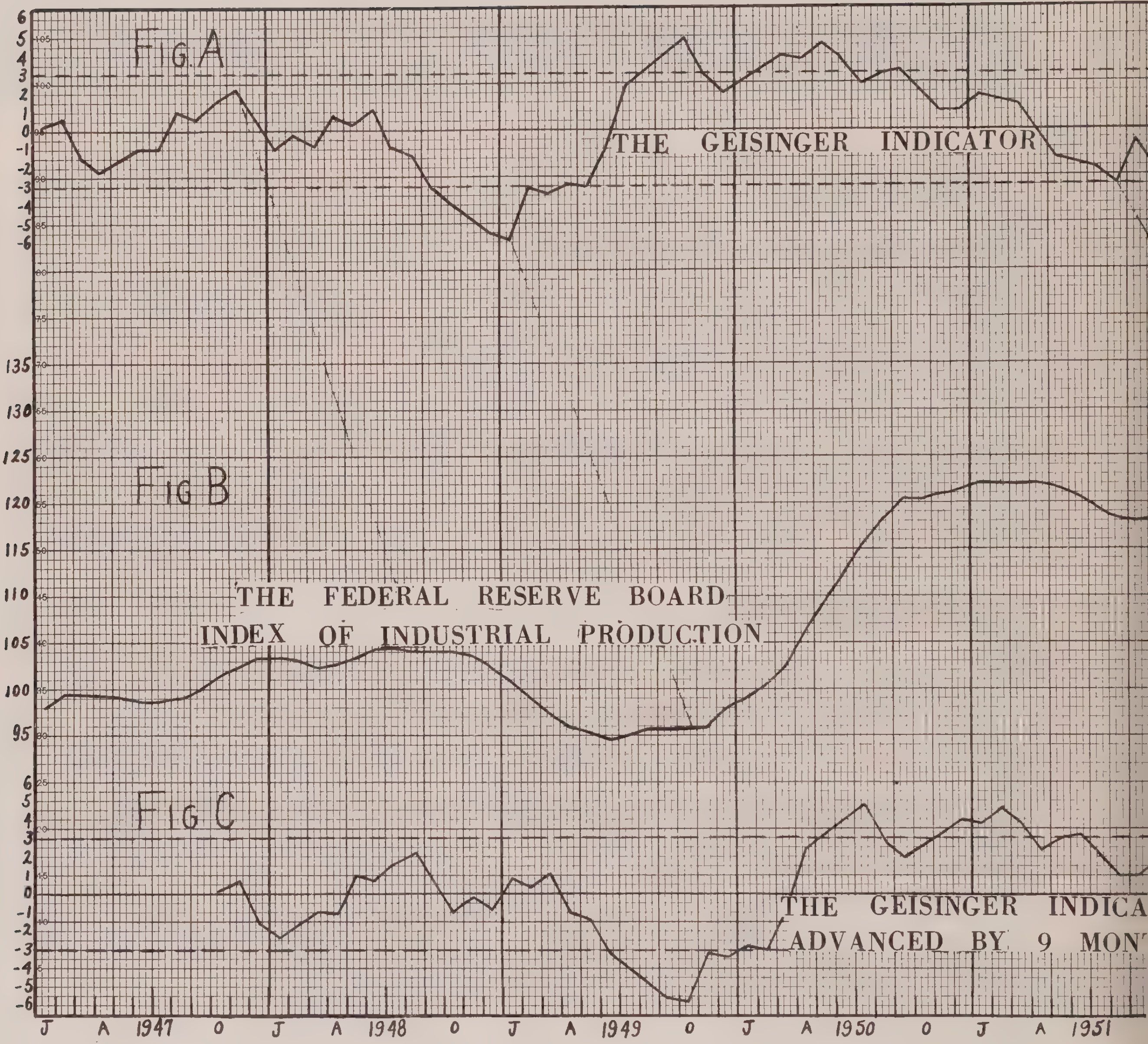
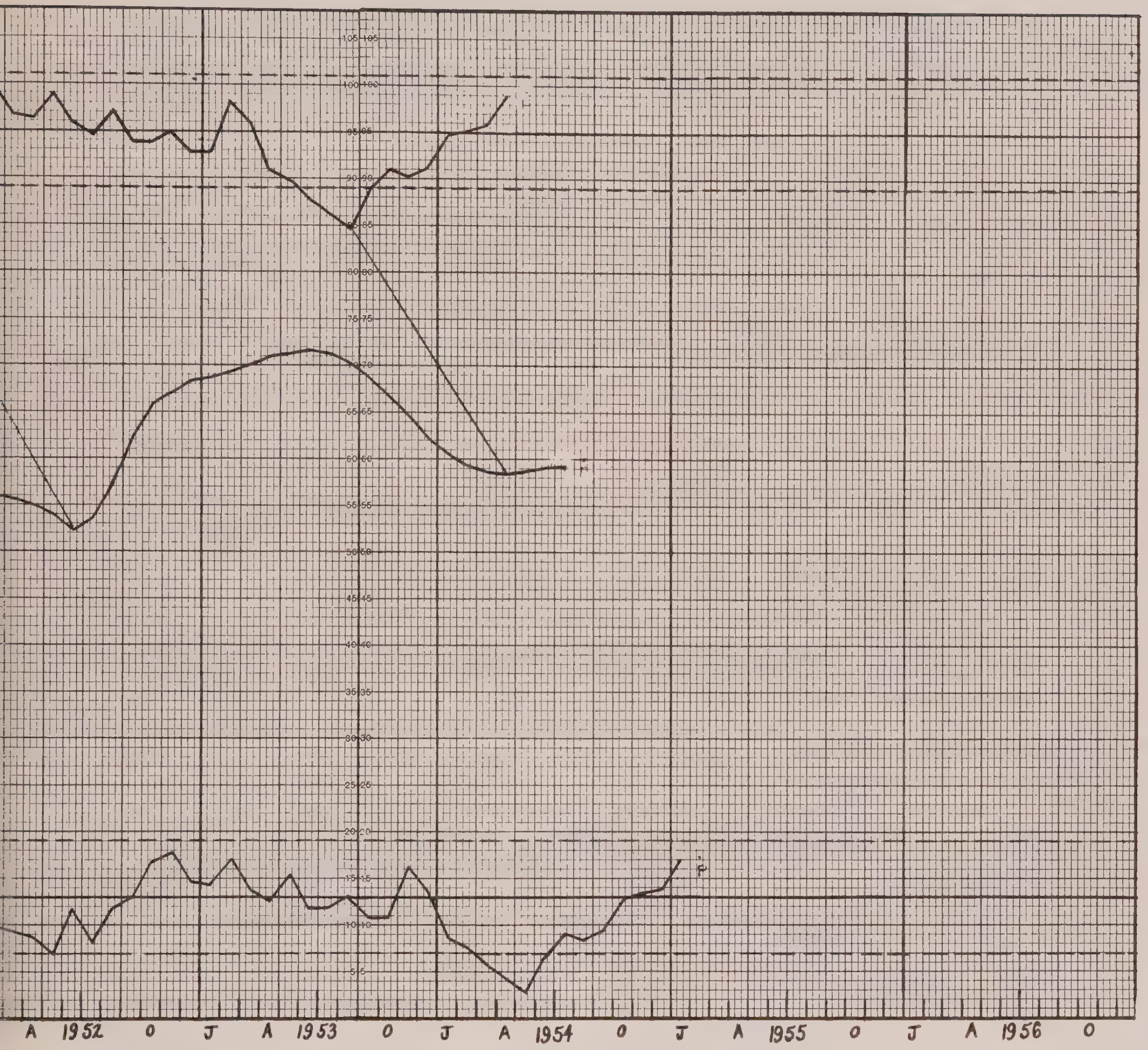


Fig. 1. Curve A. The Geisinger Industrial Production Indicator Curve. This curve is derived from certain figures which are published monthly in the *Survey of Current Business*. It moves between 6 and -6 over the period studied. It tends to turn about 9 months before the Federal Reserve Board Index of Industrial Production.

Curve B. The Federal Reserve Board Index of Industrial Production adjusted for seasonal variation and smoothed by a 3-month moving average. The value for the latest available month is shown by a dot.

Curve C. This Curve is the Geisinger Industrial Production Indicator Curve advanced by 9 months. This process projects part of the curve into the future If the relationships of the past continue, the projection gives some hint of what may happen to the Federal Reserve Board Index of Industrial Production (Curve B).

PRODUCTION INDICATOR



THE FORECAST

The Geisinger Indicator has, in the past, turned about nine months ahead of the Federal Reserve Board Index of Industrial Production.

The Geisinger Indicator turned up in August 1953. This suggested that the F. R. B. Index would turn up in April 1954. It did.

The Geisinger Indicator was still going up as of May 1954. This suggests that the upturn in the F. R. B. Index which started in April 1954 will still be going up, come February 1955. The upturn is strong and steady, like that which preceded the advance of 1950 and the advance from mid-1952 to mid-1953.

E.R.D.

Additions to the Library

"Long Time Forecast of Ohio River Floods," by E. L. Moseley, reprinted from *The Ohio Journal of Science*, Vol. XXXIX, No. 4, July, 1939, 12 pages, 1 plate.

Professor Moseley was formerly Head of the Department of Biology and the Curator of the Museum at Bowling Green State University, Bowling Green, Ohio. He died in 1948.

In this paper he tells of his discovery that the sequence of rainfall in the Ohio River Valley tends to repeat at about 45-year intervals. If you look at the records 90 years apart the patterns are even more alike. Eventually Moseley came to the conclusion that the best correspondence is to be found at intervals of 90.4 years (just twice 45.2 years). He used this time interval to make successful forecasts of floods at Pittsburgh. (The next big flood is due about 1959.)

Evidence that there is a repetition of drought and flood after the lapse of about 90 years comes from four sources: (1) Great Lakes levels, (2) tree rings, (3) records of high and low water in rivers, and (4) actual records of rainfall.

In an earlier paper Moseley showed that rainfall patterns 45 years apart are more like each other than those 22 1/2 years apart.

If 45 years work better than 22 1/2 years, there must be a reason for it. One explanation could be that there may be subordinate cycles which are unit fractions of 45 which are not unit fractions of 22 1/2.

(A unit fraction is a fraction in which the numerator is one and the denominator is a whole number, as 1/2, 1/3, 1/4, etc. Unit fractions are also called harmonics.)

Thus, if there are 15-year cycles in precipitation, three of them would add up to 45 years and would make weather repeat at 45 year intervals better than at 22.5 year intervals.

Similarly, the presence of any odd harmonic of 90.4 years such as 1/3, 1/5, 1/7, 1/9, etc. would make 90.4 years work better than either 22.5 or 45 years. The odd harmonics of 90.4 years are:

1/3 of 90.4 = 30.1
1/5 of 90.4 = 18.1
1/7 of 90.4 = 12.9
1/9 of 90.4 = 10.0
1/11 of 90.4 = 8.2

It might be profitable to search for rainfall cycles of these lengths also.

• • •

"The Sales Forecast and Its Relation to Production Control," by Carl J. Klemme, reprinted from *Drug and Allied Industries* for June 1950. Six pages, 9 figures. Gift of Dr. Klemme.

The author is Professor of Industrial Pharmacy, St. Louis College of Pharmacy and Allied Sciences. He is also a partner in the firm of Lund and Klemme, Industrial Consultants. In this paper he discusses the use of cycles as an aid to good sales forecasts.

• • •

"Physical Characteristics of Sun-Spots," by H. B. Rumrill, reprinted from *Popular Astronomy*, Vol, LV, No. 5, May, 1947, 14 pages, 5 figures. Gift of the author.

Until we know what causes sun-spots , and how to predict them and the earthly events connected with them, every scrap of information connected with them is of importance to the cycle student.

EXCERPTS FROM

CYCLES

THE SCIENCE OF PREDICTION

(CHAPTER XIII)

by **EDWARD R. DEWEY**
Director, Foundation for the Study of Cycles

and **EDWIN F. DAKIN**
Associate, Foundation for the Study of Cycles

TOGETHER WITH 1954 SUPPLEMENT

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XIII

Avoiding Some Economic Illusions

MANY BUSINESSMEN (and some economists) find it hard to use the trend and the rhythms in their economic calculations, because of an *a priori* prejudice. That is, they find it hard to believe any kind of human experience can be "determined" by factors outside the control of man's own conscious life. And so they resist recognition of the evidence. They accept the need of adjustment to the weather, knowing it is out of man's control. But they resist passionately any suggestion that changes in the social and economic climate may be beyond the total rule of man's conscious will.

A man accustomed to think that certain "causes" must always have given "results" and that we control results by advance manipulation of causes may feel especially confused. If, for instance, he believes that raising the price of gold will raise the price of commodities, then he thinks he knows the "cause" of the American price rise in 1933. How then, he may ask, could rhythms have had anything to do with it? Isn't it common sense to think that this rhythm business — whatever the evidence — is esoteric nonsense?

The fact is that most of the "causes" we commonly assign to events are the real nonsense. Science knows this. It was one of Freud's great contributions, for instance, that he showed how we do what we feel subconsciously impelled to do, and then satisfy our conscious mind by devising adequate "reasons." Most of us talk, think, and plan in the same kinds of patterns our ancestors used in days before science was born. The outcome is illusion. We must free ourselves of many of the old patterns if we are to use the knowledge that is now available.

To that end let us consider in terms of modern psychology and physics a few facts important for our approach to economic science.

P. D. Ouspensky * once asked his readers to make an experiment. Imagine, he said, that you live in two dimensions, instead of three. An easy way to do this is to imagine you are a being like a piece of paper, infinitely thin, living upon a table. You can look neither up nor down, for up and down are in a third dimension. You cannot even *think* up and down, or conceive it. For you have no thickness, and hence cannot even *imagine* thickness.

Now in the center of this tabletop where you live, there is cut a slot. In this slot there revolves a wheel, so hung that half the wheel is always below the table, and half of it above. This wheel is solid and you can see only the edge of it. Let us imagine its edge is painted in four colored segments — black, white, blue, and red. As the wheel revolves, and you observe it end-on, you of course do not know that it is a wheel you see. For you are a two-dimensional being, and therefore see only a *single line of color* along the tabletop. Occasionally, as the wheel slowly revolves, you do see that line change suddenly in color. Red will suddenly change to black, and black to white, white to blue, and blue to red again.

Now, if you observe this phenomenon long enough, you will finally decide that when the red comes up, it will eventually cause black; and when the black appears, it will eventually cause blue. You will think you know the causes of the phenomena you observe.

If a two-dimensional scientist is observing the phenomena, he will eventually discover a "law" in this continuity of event. Using this law, he will be able to predict changes of color accurately. The scientist, by the use of mathematics, might also discover that a third dimension was necessary to account for the real phenomenon he saw in two dimensions only. But neither of you could *imagine* this third dimension as a sensory reality. Nor could you know the real nature of the causes operating there. The scientist would admit this frankly, saying his law merely described what happened, without explaining it. But you, untrained in such fine distinctions, would speak boldly of a "cause" being followed by an "effect." And each "effect" would in turn become a new cause (in your way of thinking) resulting in a further effect which followed. If you persisted in this belief, you might eventually resent being told that you knew nothing about the real causality.

This little exercise in make-believe illustrates how our senses, being limited to three-dimensional experience, limit the kind of knowledge which we call "common sense." As human animals, we are three-dimensional beings. But the universe has more than three dimensions; for convenience, and to avoid mathematical talk, let us call it a three-*plus* universe. In such a universe, we shall err seriously if we think perception alone can ever tell us true causes.

When a historical event does occur, we shall probably recognize a "cause." Or rather, we think we can. But before we get to that event, we are never able to recognize in society a present cause A that will inevitably produce a future social effect B. After the stock market has gone up, for instance, almost any commentator can find a sound "reason" for its action. But before it goes up, no one can predict for sure what it will do on any particular day. In short, and to repeat: Our recognition of cause is always associated with past events that we view in retrospect.

This brings us to a vital fact: What we call our recognition of *"cause"* and *"effect"* is *somehow associated with time,* and with our perception in time. This is important to understand, for what we call time is apparently only a mode of perception. Psychology has long suspected as much; physics has laid the essential groundwork of evidence. Following Einstein's original publication of his findings, in 1905, Minkowsky showed that electrical phenomena must be regarded as occurring not in space and time separately, but in space and time welded together so closely that a joint could not be detected. Thus the phenomena of electromagnetism may be thought of as occurring in a continuum of four dimensions — three dimensions of space and one of time. *And it is impossible to separate the space from the time in any absolute manner.* Mathematics today uses a factor representing time interchangeably with factors representing space.

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* See *Tertium Organum* (Alfred A. Knopf, 1922), p. 65.

Ouspensky, approaching the problem from a psychological background, goes so far as to suggest that time is the way we experience space in its higher dimensions. That is, the unknown dimensions of space are revealed to us in time. A rough comparison, to illustrate this idea, can be found in the perception of a soldier who stands at the foot of a hill. He will not know what lies on the other side of the hill until he spends the time necessary to walk to the crest. But an aviator, in the sky directly above him, can already perceive what the soldier will not know for another half hour. The aviator sees the soldier's future experience as present, because he occupies a different *spatial* relation to the event awaiting the soldier's perception.

Modern physics tells us that two individuals separated by enough space will not even be able to know what simultaneity means. The event that is still future for one individual may be past for another located in a different frame of reference. Eddington has dramatized this relativity of time with a happy illustration:

> Suppose that you are in love with a lady on Neptune, and that she returns the sentiment. It will be some consolation for the melancholy separation if you can say to yourself at some — possibly prearranged — moment, "She is thinking of me now." Unfortunately a difficulty has arisen because we have had to abolish Now. There is no absolute Now, but only the various relative Nows differing according to the reckoning of different observers.*

Obviously, if time is relative, then our perception of cause and effect is equally relative. For cause and effect are ordered in time — cause must precede its effect, by the very definition of the words. If *Now* has no absolute meaning, neither can *Cause*. If time is only a mode of perceiving a three-plus universe, so is our idea of cause and effect.

When we put a pot of water on the hot stove, we tend to think that is what causes it to boil. But we shall do well to recognize the fact that the water boils under what may be called a "law of averages." We may assume it always will. But we know of no absolute law that it must, and the formulation of the Quantum law in physics has shown us how we are limited in our knowledge that it always does. We have no grounds for predicting that any selected, single molecule of the water will boil. We predict on the basis of the group. As Eddington phrases it:

> When we ask what is the characteristic of the phenomena that have been successfully predicted, the answer is that they are effects depending on the average configurations of vast numbers of individual entities. . . . The laws governing the microscopic elements of the physical world — individual atoms, electrons, quanta — do not make definite predictions as to what the individual will do next. . . . But short odds on the behavior of individuals combine into very long odds on suitably selected statistics of a number of individuals. . . . *All the successful predictions hitherto attributed to causality are traceable to this.* It is true that the quantum laws for individuals are not incompatible with causality; they merely ignore it.
>
> Human life is proverbially uncertain; few things are more certain than the solvency of a life insurance company. . . . The eclipse in 1999 is as safe as the balance of a life insurance company; the next quantum jump of an atom is as uncertain as your life and mine.*

Having come thus far, it is hoped that the reader now understands we are sailing no esoteric seas, but are cutting away some underbrush to reach firm, sound ground. Here is that ground: In economics, as in physics, we cannot predict what any given individual will do. But we do have useful methods of predicting what groups will do. And we can succeed within tolerable margins of error. In using our knowledge of rhythms to do exactly this, we rely, just as in physics, on statistics for large numbers of individuals. In using them, we ignore the usual concepts of causality. And we ignore the fact that the future where the predicted action will occur is not yet present to the senses. An equation that will be balanced in the future is just as valid as "$2 + 2 = 4$" is now.

After an event has happened, the human mind will always seek to associate it with another event which can be thought of as a cause. This is a characteristic mental need of man, who tries to impose his own special kind of order on the whole universe, in the process of trying to understand that universe. But it is not a need of science. Indeed, it merely handicaps scientific inquiry into the real nature of the universe, and of the phenomena of which we are a part. The new economics, having adopted this approach, has made more progress in a few decades than was accomplished during whole generations of economic argument over which came first, the hen or the egg.

Economists who have viewed society as a mere multiplication of individuals, and so tried to describe it in terms of each individual's reason-why, were bound to fail. People banded together in an economic community are more than a simple sum of individual beings. As "members one of another" they form a biological organism whose whole is always greater than the sum of its parts. They are cells subject to the mathematical laws which control aggregates. The scientist who studies them with the techniques of true science is no more concerned with their individual concepts of reason-why than he is interested in the possible thoughts of the yeast cells whose life in a test tube he charts on a graph. His only proper question is not why they act as they do, but how and when. With people en masse, as with yeast cells, his graphs will tell.

The individual need not feel his intellectual dignity hurt by this reserved approach to the affairs in which he plays a part. To the man who quails at this approach we may extend the promise that when prices go down he can always discover what looks like a cause; when they go up, he can also discover a plausible cause; and when they remain stable he will always be able to cite a reasonable reason. We need not argue with him about the reality of the causes he thinks he sees in operation. We have a much briefer way out. We merely show him Fig. 1 and ask him what he sees. Depending on the focus of his eye, he may see an urn, or two faces, or the entrance to a cave — or what he will. If his focus on a phenomenon in two dimensions will play him such tricks, what may not happen when he views events in three dimensions? And how can he ever hope to know the true nature of an event in a three-plus universe?

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* *The Nature of the Physical World* (The Macmillan Company and Cambridge University Press), p. 49.

* *Ibid.*, pp. 300–302.

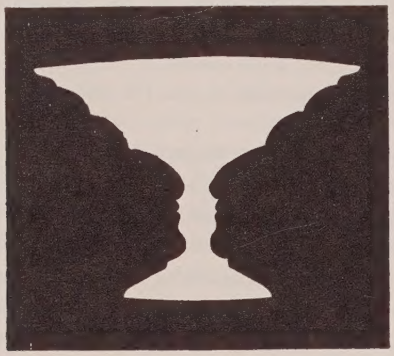

Fig. 1. Illusion

What you see here depends on the focus of your attention. A cave entrance? Glowering Jap wrestlers? (After Ruben and Hartman.)

This is not nihilism — it is the essence of sound approach to knowledge. For only by knowing the limitations of our working tools can we properly value the results. And only by recognizing the limitation of mind can we think truly.

The outcome is itself sufficient justification of the method — an outcome that permits prediction, which is the goal of every true science. The method has another advantage — it draws economics close to all the other sciences, just as they, too, converge. " The separate sciences — epistemology, physics, chemistry, mathematics, astronomy — are approaching one another with acceleration, converging toward a complete identity of results." Those were the words of Spengler; he could well have added biology, psychology, economics, and sociology to his list.

It is not the business of economics to explain *how* the human mind divides a series of events up into Past, Present, and Future; this is a problem for other sciences. But for progress in the ability to make useful predictions in the economic field we do need all the knowledge that the other sciences have to offer on this subject. And we need a working hypothesis (we may accept it wholly tentatively) which permits us to understand how the future already exists in the present — not as the result of a *cause* now in operation, but as the continuance of a pattern. Sir James Jeans offers us a physicist's hypothesis:

" It may be that time, from its beginning to the end of eternity, is spread before us in the picture, but we are in contact with only one instant, just as the bicycle-wheel is in contact with only one point of the road. Then, as Weyl puts it, events do not happen; we merely come across them." *

Whatever hypothesis we prefer, we must avoid one temptation as we look at our charts that project patterns into the future. We must always regard cause-and-effect thinking as only *partial.* We can even call it three-dimensional thinking applied to a three-plus environment. When we are tempted to use it, in estimating the future, let us recall the two-dimensional being on the table top. Let us imagine that he liked the color red very much, and that he was one of a whole colony of such beings living around the wheel. When red came into view on the tabletop horizon, he and his fellows felt gay and happy all over. They joined hands — touching two-dimensional finger tips. They spun round and round in dancing. So pleasant was their sensation that they started an inquiry to ascertain what measures could be taken to keep the red always in view.

A group of investigators was appointed, with the object of making an orderly inquiry. It was found that the red always appeared after a period of community malaise during which the color had been blue, for which no one cared. Following a long spell during which various community readjustments to life with the blue had been made (and these were catalogued at length), the community suddenly felt a new access of well-being. Simultaneously the red appeared. The investigators could report that the red was therefore undoubtedly the result of a balanced state in the economy, reached as a result of the readjustments in the blue period. Unfortunately, as the dancing activity mounted during the happy red period, excesses apparently developed, which the investigators saw evidenced in the fact that the tempo of the spinning grew exceedingly rapid. The investigators measured these mounting excesses, and compiled them into voluminous statistical reports. It was their unanimous conclusion that the sudden passing of the red — which had happened so many times in their two-dimensional history — had always been the direct result of such excesses. The investigators ended their report with recommendations for a further study as to legislation that would keep the excesses under control.

Fantasy though that may seem, it has as much sense in it as many of the prevailing economic doctrines which dispute learnedly over the " causes " in the world we live in.

It is not within the province of our charts to tell us about the nature of that world. But it is their virtue that they enable us to avoid, in thinking about it, some of the illusions inherent in cause-and-effect argument.

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* *The Mysterious Universe* (The Macmillan Company and Cambridge University Press), p. 127.

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